The role of universities in building prosperous knowledge cities: the Malaysian experience

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Abstract: *This paper explores the role and importance of universities, particularly in the Malaysian context, for building prosperous knowledge cities of the rising knowledge economy. It aims to shed light on how universities contribute to the knowledge-based development of Malaysian cities by undertaking a case study investigation. In the case of Bandar Seri Iskandar, the paper scrutinises the creation – from scratch – of a knowledge city, including the establishment of new public and private universities and hence providing a unique opportunity to understand how the idea of the knowledge economy has permeated economic development policy within a developing country context. The research findings reveal that in Malaysia, much like many of the developed countries, universities are being positioned to play a major role in supporting knowledge city (trans)formation. While there has been a tangible success on the spatial development based on a rapid land use change towards accommodating knowledge-intensive land use and activities, the research reports that a more concerted and coordinated effort from academia, public and private sectors are needed to further foster the growth and development of economical, environmental, institutional and social aspects of Bandar Seri Iskandar to become a fully functioning prosperous knowledge city.*

Keywords: *Knowledge city; knowledge-based urban development; knowledge economy; knowledge industries; knowledge workers; universities; higher education and research institutes; Bandar Seri Iskandar; Malaysia*

1. Introduction

The 21st Century is witnessing a new type of city form, *knowledge city*, and a new approach in its development, *knowledge-based urban development* (Ergazakis *et al.*, 2004; Carrillo, 2006; Yigitcanlar *et al.*, 2008a; Metaxiotis *et al.* 2010). In this context, universities are regarded as one of the key elements for knowledge-based urban development and knowledge city formation due to their ability to provide a strong platform for knowledge generation, marketing and transfer (Coffield and Williamson, 1997; Karisson and Zhang, 2001; Martinez-Fernandez, 2008), and also to function as engines for the development of human capital that is vital for building a talented community – *knowledge society* (Castells, 2000). As worldwide transformation of cities into knowledge cities also begin to focus on knowledge and human capital, universities now have become the primary institutional recipients of large investments in support of necessary knowledge infrastructure required for knowledge city formation (Gunasekara, 2004).

This paper investigates the roles of universities, in the context of Malaysia, in building prosperous knowledge cities. The Malaysian knowledge city experience is particularly unique as unlike to many developed country counterparts knowledge-based urban development in Malaysia is part of the national development strategies and plans (i.e. National Urbanisation Policy, National Physical Plan), and therefore, knowledge city policies are mostly top-down, highly Central and State Governments supported and immensely proactive. This paper scrutinises how universities contribute to the knowledge-based development of cities by undertaking a case study investigation of a Malaysian knowledge city that is currently being developed. Bandar Seri Iskandar, Perak, a city with high concentration of public and private universities, is chosen as the case study to shed light on the phenomena of the creation – from scratch – of a knowledge city in Malaysia. The development of Bandar Seri Iskandar, as a new knowledge city, was initiated by the Perak State Government for about three decades ago, and the priority was given particularly to the development of a high concentration of public and private universities and other higher education and research establishments (KPerak,

2010). Primary purpose of this prioritisation was to benefit from these institutions as powerful magnets for attracting knowledge-industries, -businesses and -workers.

While most knowledge city initiatives in Malaysia are located within an existing metropolitan area setting and equipped with an adequate level of existing infrastructure, Bandar Seri Iskandar is one of the unique examples of the greenfield type knowledge city development (Perak Tengah District Council, 2002; Mohamedbhai, 2002). The city, with its inorganic and greenfield type development, provides an interesting case for exploring the roles and impacts of newly established universities in knowledge-city formation of localities with no previous economic, social and cultural activities to anchor such development.

The methodological approaches utilised in this research consist of: (a) a thorough review of the literature on the relevant topics including knowledge cities, knowledge-based urban development, knowledge economy, knowledge industries, knowledge workers, universities, higher education and research institutes, and knowledge-based development policies of Malaysia; (b) a case study investigation on the role of universities in knowledge city formation at a relatively new city that is currently being developed – Bandar Seri Iskandar, Perak, Malaysia, and; (c) a set of interviews conducted with the prominent actors that have involved in the development process of Bandar Seri Iskandar – i.e. State and Local Governments and university representatives.

Following this introduction, in Section Two, the paper provides a review of the literature on the roles of universities as a catalyst for knowledge city formation. Section Three focuses on the Malaysian context and discusses the roles of universities in building knowledge cities in Malaysia. Section Four reveals the findings of a case study of a Malaysian knowledge city that is currently being developed – Bandar Seri Iskandar. Then the paper concludes, in Section Five, by reporting the learnings from the Bandar Seri Iskandar case study that might provide lessons for other cities aiming to utilise universities as key leverages for supporting their knowledge city (trans)formations.

2. Universities as prominent catalysts for knowledge city formation

2.1. Universities and knowledge cities

In recent years, universities are regarded as one of the key knowledge infrastructures, with their ability to provide a strong platform for knowledge generation, marketing and transfer, in support of forming knowledge cities (Carrillo 2004; Martinez-Fernandez, 2008; Yigitcanlar *et al.*, 2008b). According to Gunasekara (2004), universities were once described as ‘ivory towers’ focusing only on the traditional academic practices of teaching and research, with hardly any serious commitment to addressing questions arising from the spatial and socio-economic implications within which they function. However, the role of universities has eventually become more significant with the emergence of the knowledge economy, and at present, universities are progressively being viewed as powerful drivers of innovation, change in science, technology and other creative disciplines, and more importantly, universities have been regarded as a new trajectory for knowledge-based urban development (Sharma *et al.*, 2006; Benneworth, 2007).

Karrison and Zhang (2001, p.181) state that “universities are the main actors in the knowledge generation process [and] one could interpret the knowledge sector that appears in endogenous growth models as an aggregation of all universities in an economy”. Coffield and Williamson (1997) note that universities have a pivotal place in our complex society, where new thoughts can be developed and existing wisdom can be challenged. Mavin and Bryans (2000) further add on that by highlighting the special role of universities in the development of cities. According to Henry and Pinch (2000), successful knowledge cities have been linked with the growth of knowledge clusters embedded in communities of knowledge that are mostly formed by the support of universities.

Around the globe, many universities now are directly involved in the formulation of vision, strategy and action plans for their cities to become prosperous knowledge cities (Yigitcanlar, 2009; Yigitcanlar

et al., Forthcoming). For example, The Office of Knowledge Capital in Melbourne is established by eight Melbournian Universities to work with the city, government, academic, and business sectors in promoting Melbourne locally and globally as a knowledge city (Yigitcanlar 2010; OKC, 2011). Besides this direct involvement in knowledge city strategy making, in the era of the knowledge economy, universities are also assigned not only with a responsibility of fostering knowledge workers and generating new knowledge and skill sets, but also becoming the 'seedbed' and 'incubator' for new industries, products and services. This incubation capacity has turned universities into a key player in the knowledge-based urban development process and in nurturing knowledge cities (Knight, 1995; Franz, 2008; Hearn, 2008).

2.2. Universities, knowledge industries and knowledge workers

Universities stand prominently in any discussion of the production, diffusion, and deployment of knowledge and innovation that supports economic growth (Felsenstein, 1996; Geuna, 1998). They contribute to knowledge city formation by supporting regional innovation systems and emergence of successful clusters of knowledge industries that are innovative and competitive in stimulating growth (Enright, 2001; Metcalfe and Ramolgan, 2005).

The importance of the regional scale and the importance of specific and regional resources in stimulating the innovation capability and competitiveness of knowledge industries and regions, and promoting knowledge cities' development are widely acknowledged (Asheim and Isaksen, 2002). Studies on clusters, knowledge spillovers and regional innovation suggest that the accumulation of information and knowledge and the flow of ideas that occur in one geographical area depend on the concentration of knowledge industries and R&D activities, including universities. An important characteristic of clusters is their ability to create space for collective learning and to promote knowledge sharing. Porter (2003) refers knowledge clusters as a geographically proximate group of interconnected knowledge companies, suppliers, service providers and associated institutions in a particular field, linked by externalities of various types.

Universities may be linked to knowledge industries by the supply or even by the exchange of high-skilled researchers (Mansfield, 1998; Caloghirou *et al.*, 2001). However, apart from universities, other public and private institutions may be needed for the development of knowledge clusters – i.e. triple helix model. Thus assisting the development of appropriate infrastructure contacts between public institutions, universities and the private knowledge firms of a region is regarded as important in generating innovation and creating cities a platform for competition and transformation into knowledge cities (Blien *et al.*, 2008).

In addition to clustering, knowledge industry-specific competencies and learning processes can further lead to regional competitive advantages, if they are based on localised capabilities such as specialised resources, skills, institutions and share of common social and cultural values (Maskell and Malmberg, 1999). In other words, regional development and competitiveness occur in places where localised capabilities such as institutional endowment, necessary infrastructures, knowledge and skills strongly exist (Asheim and Gertler, 2004; Ergazakis *et al.*, 2006).

In the era of knowledge economy, beyond knowledge industries, talent and creativity are becoming important elements in shaping economic opportunity in cities (Yigitcanlar *et al.*, 2008c). Prosperity of a city now depends largely on the ability to create economically profitable new ideas. The claim that the growth of cities is related to human capital dates back to Jane Jacob's work on the economy of cities (Jacob, 1969), and now in the knowledge economy and knowledge-based urban development, knowledge workers have become perhaps the most important actors of knowledge production.

Yigitcanlar *et al.*, (2007) refer a knowledge worker as a radically new type of worker, precisely one who is free from machine domination and is not related to any industrial worker. Knowledge workers are also defined by proxy measures as either the top three standard statistical occupational codes (i.e. managers, professionals, and technical workers) or people with a graduate or higher level of education

(Brinkley, 2008). Contributions of knowledge workers are often mentioned as strategic and valuable and the literature confirms the importance of knowledge work, knowledge industries and knowledge workers as the engines of growth (Florida, 2005; Yigitcanlar *et al.*, 2007). Knowledge workers are highly mobile and they are expected to change jobs, if not occupation, more frequently. Thus, they favour urban environments that offer 'thick labour market' providing opportunity to advance their careers by moving between employers.

In the era of knowledge economy, knowledge-based urban development needs to focus on catering and attracting knowledge workers, knowledge-based activities and high technology industries that are expected to contribute significantly to city competitiveness (Knight, 2008). There exist a symbiosis between knowledge workers and knowledge industries whereby the latter provide jobs opportunities and the former contribute to the growth of the latter. Florida (2004) suggests a formula that links 'three Ts', tolerance, talent and technology, with good people and business climates to generate economic growth. There are a number of essential aspects for attracting and retaining knowledge workers to an area aiming to build a new knowledge city, and Yigitcanlar *et al.* (2007) categorise these aspects under four essential criteria (i.e. quality of life, urban diversity, social equity and quality of place) and their respective requirements, including high quality universities.

3. The Malaysian context

3.1. Malaysian universities and knowledge cities

Much like in the developed country context, universities in Malaysia play a significant role as a knowledge source in the growth of national and regional innovation systems, and hence, in the building of Malaysian knowledge cities (Mohamedbhai, 2002). Universities in Malaysia have been regarded as one of the best agents for change in stimulating nationwide urban development, whether they are in regional or metropolitan areas. More importantly, universities are supporting and facilitating the Malaysian vision and mission of becoming a fully developed nation and transforming Malaysia into a knowledge society by the year of 2020. In order to accelerate the realisation of the Vision 2020, universities in Malaysia have been identified as one of the prominent actors in the knowledge generation process and powerful drivers for innovation and change (Razak and Saad, 2007; Mahathir, 2009).

The need to better define the role of universities in Malaysia has also been recognised not only by the government but also by the universities themselves. The Malaysian government introduced a new university type, 'Research University', whereby these new universities receive higher financial support and their staffs are granted with generous research funding with an aim of boosting research excellence and its indirect contribution to socio-economic development of their cities and regions (Gibbons, 1998). Establishing research universities has already started to enhance the knowledge base of the economy by efforts resulting in universities to become more entrepreneurial entities. Furthermore, universities in Malaysia are now acting as key players in the process of endogenous and locally-based development strategies, and they are also becoming enablers and leaders of regional socio-economic development and innovation systems (Phang and Sanusi, 2001).

During the last couple of decades, the success of the Silicon Valley model has also inspired Malaysia to further realise and recognise the importance of universities in the development of knowledge cities. Malaysia fully appreciates the success of the Silicon Valley model. This model was based on intellectual and scientific dynamism of Stanford University, which stands out in the forefront of global research in the same way that Cambridge University served as an intellectual hub for the innovation cluster that was developed around it. Both Stanford University and Cambridge University did much more than providing skilled labour to knowledge industries; they also have managed to stimulate urban growth (i.e. contribute to the knowledge city formation) and generate a research atmosphere that was dynamic and commercially successful (Kenny, 2000).

The shift from primary sector-based economy to the knowledge economy is a part of a wider plan to achieve the objectives of the Malaysia's Vision 2020. The vision is a 30-year plan to push Malaysia to achieve a level at par with the developed nations in terms of economic performance and technological capability (Yusuf and Nabeshima, 2009). The context of building knowledge cities has been embedded in the vision as a challenge to establish a scientific and progressive society, a society that is innovative and forward looking, one that is not only a consumer of technology but also a contributor to the scientific and technological civilisation of the future – knowledge society (Faaland *et al.*, 2003).

Malaysia's long term objectives to move into the knowledge economy era are reflected in the various development plans. Firstly, the Outline Perspective Plan states the need for the knowledge economy as to provide a platform for Malaysia to sustain a rapid rate of economic growth, enhance global competitiveness, and strengthen Malaysia's capability to innovate, adapt and create endogenous technologies. Secondly, as Malaysian planning system is originated from the British system, future spatial development is directed by policies outlined in the hierarchical order of plans – such as National Physical Plan, Structure Plans and Local Plans. These development plans are prepared considering the aspirations of the country, which are spelt out in the national economic and social development plans. As such the direction of future spatial development in Malaysia is foreseen to correspond to the vision of building knowledge cities around major universities. In the light of these plans the foundation of knowledge cities first seeded in Malaysia around mid 1990s with the launch of the 'National Information Technology Agenda' and the 'Multimedia Super Corridor Project' (Jomo, 2009).

3.2. Malaysian universities, knowledge industries and knowledge workers

In early 1990s, Malaysian Ministry of Higher Education significantly revised the national educational policy to be compatible with the new economic development policy of the country and become at par with other developed countries that have already restructured their higher education systems (Lee, 2004). The number of public universities almost tripled from merely eight before 1990 to 20 in 2009 and the government also increased the number of polytechnics and community colleges to cater for the needs of communities and industries for the era of knowledge economy that Malaysia is entering. Private universities saw the number growth from zero in 1990s to 37 in 2007, and another form of private institutions (such as private colleges and foreign university branch campuses) grew from 156 in 1992 to 460 in 2009 (Evers *et al.*, 2010). The expansion of these institutions has created new groups of individual proprietors, private companies, consortium of companies, public listed companies, government corporations, foundations, philanthropic organisations and community financing (Lee, 2004).

Although the formation of the abovementioned groups is derived mainly from the lucrative business of higher education in Malaysia, the expansion has also contributed to regional growth nationwide. Looking at the past 200 years of Malayan history, it becomes clear that the establishment of universities was not only motivated by the quest for education and knowledge, but has impacted the multiplier effect on regional growth, where these institutions are located (Ani and Aminuddin, 2009). Figure 1, 2 and 3 show production (i.e. agricultural and industrial) corridors, location of universities, and concentration of knowledge workers in the Peninsular Malaysia. These three figures illustrate that knowledge workers are not only heavily concentrated around production activity hubs, but also mostly clustered around knowledge activity hubs (i.e. universities).

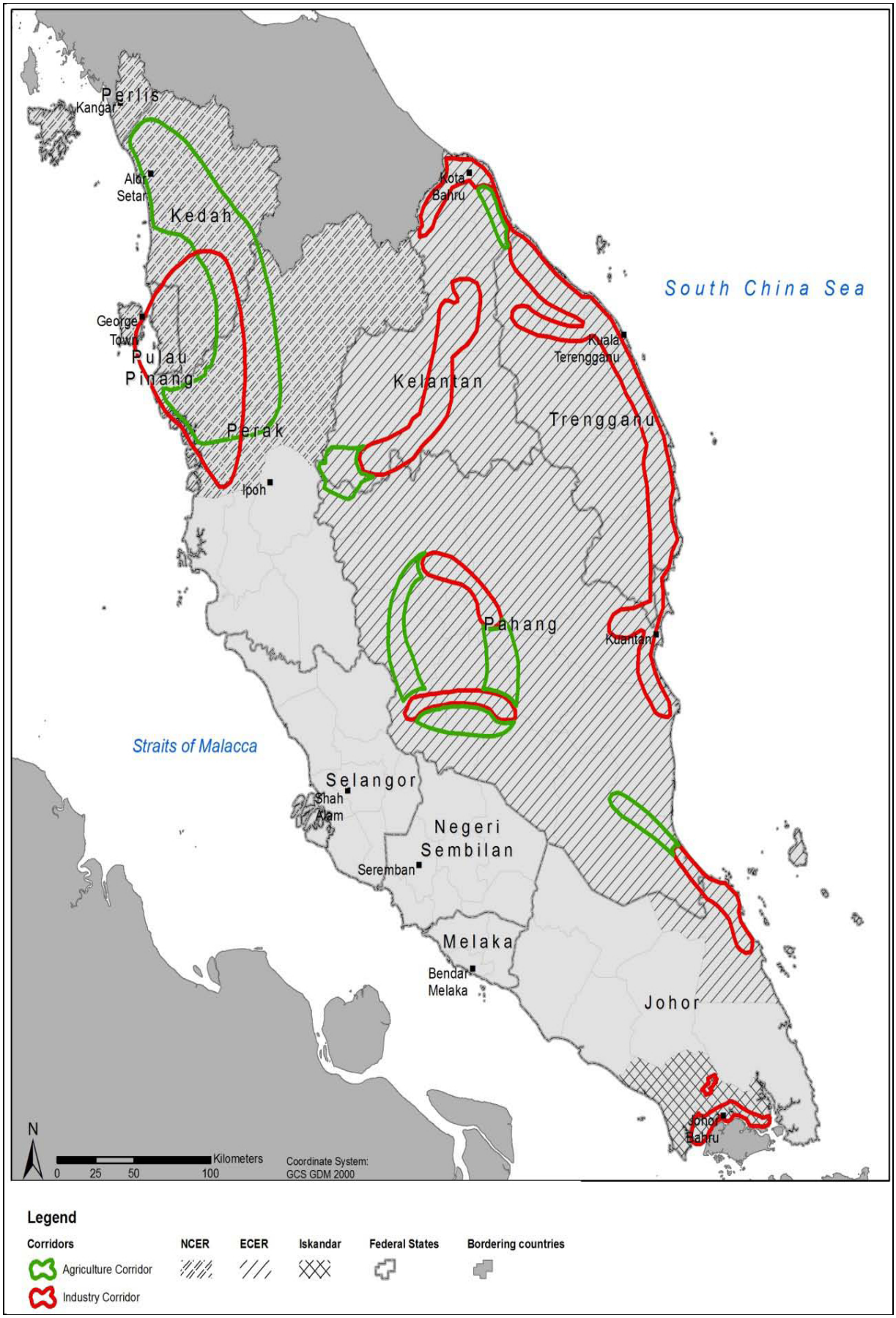

Figure 1: Location of the main production activity corridors (Evers *et al.*, 2010)

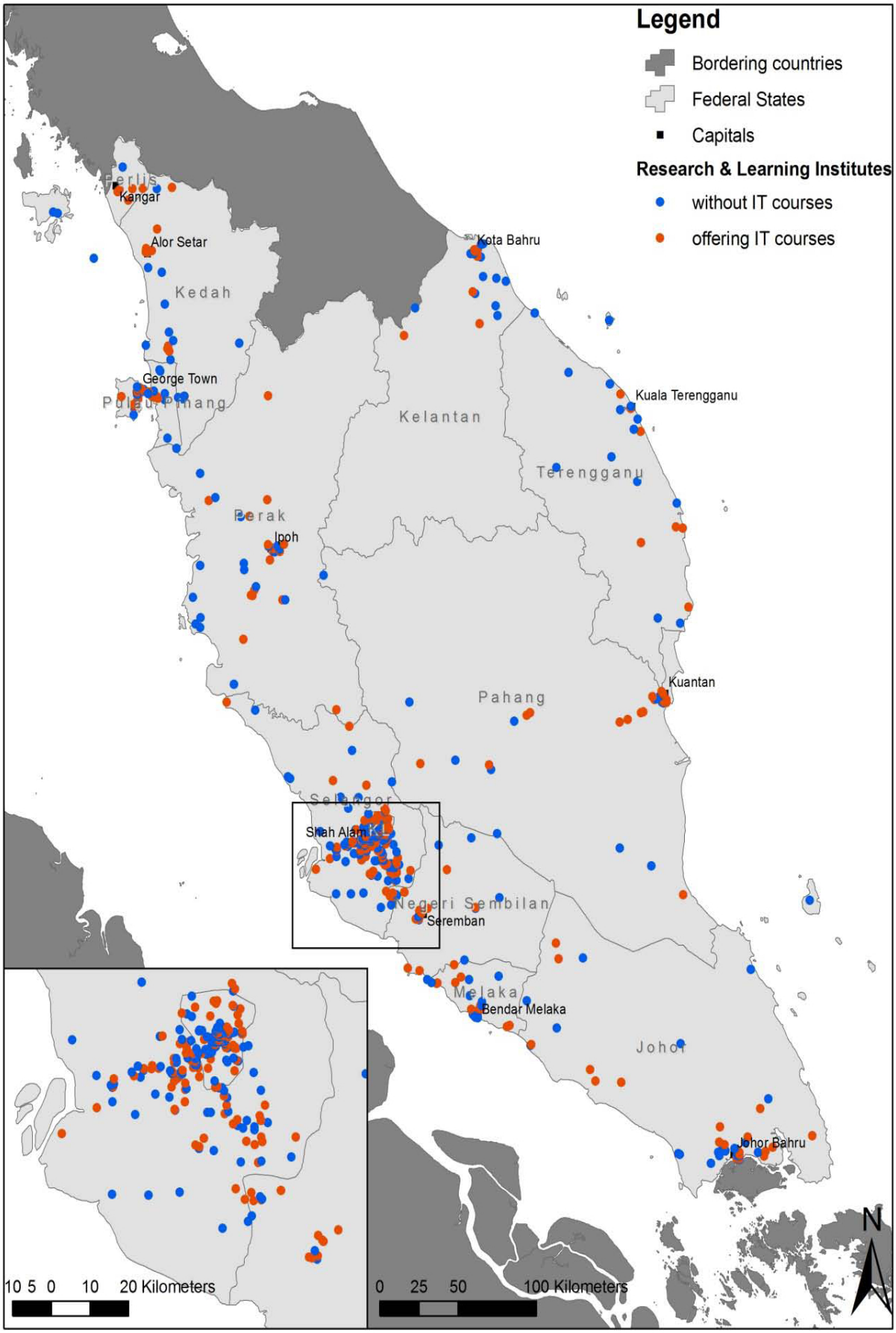

Figure 2: Location of the major universities (Evers *et al.*, 2010)

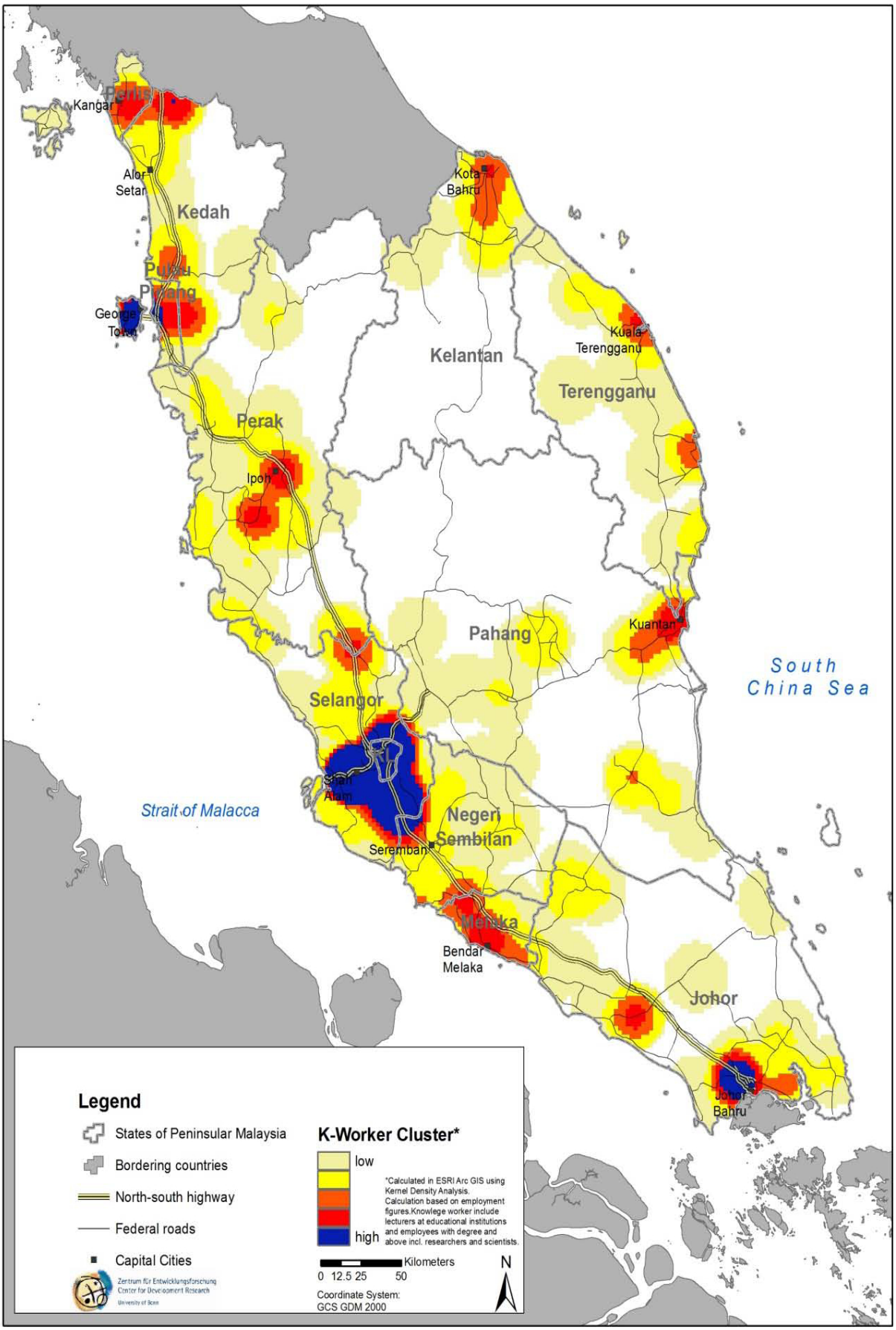

Figure 3: Location of the knowledge worker clusters (Evers *et al.*, 2010)

The increasing importance of universities in Malaysia and the emphasis on knowledge industries and knowledge workers can be traced back to mid 1990s when Malaysia launched National Information Technology Agenda (NITA) and the Multimedia Super Corridor Malaysia Project (MSC) (Economic Planning Unit, 2001; Menkhoff *et al.*, 2010). While the NITA objectives are very much geared towards the formulation of strategies and promotion of information and communication technology (ICT) utilisation and development, the MSC initiatives are aimed at creating an ideal knowledge generation environment as well as creating a global test bed to enable Malaysia to become globally competitive to attract knowledge-workers, -industries and -businesses. The MSC development project, along with NITA, serves as a catalyst to expand knowledge economy by creating an attractive and suitable environment for the development of new knowledge-intensive businesses, industries and activities in Malaysia (MDec, 2008).

In the MSC case, universities have been identified as core agents to foster knowledge workers and provide a platform for a better interaction between R&D activities and industrial partners (Ramasamy, 2002). The MSC initiative appointed the Multimedia Development Corporation (MDeC) as a one stop agency to manage the operation of the MSC Malaysia. The First Phase of the MSC development (which began in 1996) was the initiation stage emphasising on visioning and physical infrastructure. The Second Phase of the project (which spanned from 2004 to 2010) focused on the supply side – creating economies of scale and flagship applications. During these two phases, MDeC managed to attract a core group of world-class companies of knowledge-industries in the designated knowledge cities of the MSC. MDeC has also developed and implemented crucial knowledge-based development policies and projects that provided high quality work-live-play environments that attracted and also retained a significant number of knowledge workers within these cities. MSC Phase Three (runs from 2011 to 2020) builds on the foundation and achievements of the Phases One and Two, and at the final Third Phase of the project, MSC is expanded to the entire country aiming to provide a spin for a complete transformation of the nation's economy into knowledge economy and its society into knowledge society (MDeC, 2006; 2008). In this final Phase, all Malaysian public and private universities are assigned with tasks to play critical roles in promoting the formation of knowledge cities in Malaysia in order to support the nation's transformation into a knowledge economy and society.

4. The case of Bandar Seri Iskandar

4.1. An emerging knowledge city

Bandar Seri Iskandar is the capital of the District of Perak Tengah and located at the central part of the State of Perak, the second largest State of the Peninsular Malaysia (Figure 4). Perak holds a unique position in the history and economic development of Malaysia. In the past Perak has played a critical role in Malaysia's economic development by being an important tin mining centre, a state with large agriculture plantations of rubber and oil palm, and a well developed education sector hub with good and reputable boarding schools. However, much of this has changed after the collapse of the tin market, and the economic diversification policy of Malaysia. Malaysia's move into the knowledge industries (i.e. multi-media, electronic and electrical) has led to the creation of clusters in other states such as the Klang Valley in Selangor, Johor Bahru in the South, and Penang in the North. This led to an outflow of labour and local investments to these other lucrative locations, leaving Perak with little or no opportunities to engineer a revival of its economic prowess (Ramasamy, 2002). This has been further compounded by the development of the North-South Highway, which has facilitated an efficient national transportation network. However, because the highway is located quite far from the main towns of Perak, it had no positive impact against the economic deprivation of these towns.

Figure 4: Location of Bandar Seri Iskandar

Perak, nevertheless, continues to hold a unique position within Malaysia. Compared to other Malaysia states, it is one of the developed states whereby it has almost 9% of the country's population of 23.1 million and it contributes to over 10% of the country's GDP (Economic Planning Unit, 2006). Perak has a significant amount of urbanised population – 60% (Department of Statistics, 2000). This is an important locational consideration for service and ICT related manufacturing industry sectors as these sectors, being anchors of the knowledge economy, tend to cluster around large urban areas with solid infrastructure and urban facilities.

At present, Perak, as visioned in The 9th Malaysia Plan, is rigorously developing knowledge-based urban growth policies that are geared towards the milieu of knowledge economy in order to seek new investments and job creation opportunities. The Perak State Structure Plan (2001-2020), which oversees the urban development of the State, has an overall vision of striving Perak to become a fully developed liveable state that provides prosperity and quality of life and place to its people. The Plan aims to achieve this vision through establishing a sustainable and knowledge-based development and efficient and effective use of its financial, natural, human, and cultural assets (Perak Tengah District Council, 2002).

The State Government has a vision to transform the State's economy into a knowledge economy by 2015, with ICT as major contributor to economic growth. The introduction of a new initiative, called '*KPerak – from Tin Mines to Mind Industries'* in 2007, is seen as a big milestone for the State in addressing the requirements of knowledge economy. *KPerak* is a trust company established by the State Government of Perak, to implement and execute initiatives outlined in The ICT Strategic

Blueprint of Perak (2010). The *KPerak* initiative is aimed at facilitating the Government's vision of a 'Knowledge Government' in 2020, in line with Malaysia's Vision for 2020 (KPerak, 2010).

Five key areas have been identified by the Strategic Blueprint were knowledge government, knowledge economy, knowledge infrastructure, knowledge workers and knowledge society. The *KPerak* is responsible for creating and promoting effective linkages between academia and industry to ensure the knowledge-based development of the State. The State Government of Perak aims to work as a catalyst, encourager, information provider and best practice exemplar for the citizens, industries, businesses as well as counterparts from all around the world (KPerak, 2010).

Within the *KPerak* initiative, Perak Tengah District and Bandar Seri Iskandar have been identified as a knowledge region and a knowledge city respectively. The Perak Tengah District Local Plan states its vision as to establish the district as a knowledge region and its capital city Bandar Seri Iskandar as a knowledge city, particularly specialised as a centre for education, governance, industrial and tourism activities and maintain its quality of natural environment and historical values (Perak Tengah District Council, 2002; 2011).

Bandar Seri Iskandar is a 2,000 hectare new city, started to be developed in 1990 and located on an area that used to be an agricultural land with tin mines. The city is branded with a title of 'Emerging Knowledge City' jointly by the State Government and District Council mainly due to its potential in attracting knowledge-industries, -businesses and -workers through its universities, government agencies and increasing knowledge worker population (Table 1). In 2000, the city reached to a resident population of slightly under 100,000 people where almost one-third of the population were knowledge workers – i.e. university staff, government and private institution employees, etc. (Perak Tengah District Council, 2002; 2011). At a national scale, the city has been ranked as the main settlement area according to the standards set by the National Urbanisation Policy. The city is geared to become a fully fledged knowledge city by 2020 with its two regionally engaged universities as a catalyst for urban growth and a harmonious land use balance of residential, recreational, commercial and knowledge industry and business developments. The city is considered as a mammoth project in the heart of the Kinta-Pangkor Knowledge Corridor in Perak, 30 km from Ipoh, the capital of Perak, and 30 km from Lumut, the main seaport.

Table 1: Higher education, knowledge and government institutes of Bandar Seri Iskandar

UNIVERSITIES, HIGHER EDUCATION AND KNOWLEDGE INSTITUTIONS	PUBLIC SECTOR AGENCIES
Universiti Teknologi Petronas (UTP)	Public Industrial Entity District Office
Universiti Teknologi MARA (UiTM)	Local Authority District Office
National Youth Skill Training Institute	Royal Malaysian Naval Office
MARA Professional College	Magistrate Court
Pharmaceutical Technology Park	Radio Television Malaysia State Office
AgroTech Industrial Park	District Engineers Office
Research and Development Centre	District Education Office
Knowledge Worker Residential Precincts	Social Welfare Agency for Progressive Society District Office
Medical and Health Centre	Seri Iskandar Security Headquarters
Motor Sport Centre	Fire and Rescue Department Regional Office

The city is accessible via Federal Route 5, which is recently upgraded into a four-lane dual carriageway, ensuring the necessary transport infrastructure facilities for this emerging knowledge city. The development of the city is supported with additional commercial, residential, high-tech industrial, R&D centre and recreational facilities. The development also includes affordable housing, commercial shops and offices, the Bandar Seri Iskandar Pharmaceutical Technology Park, as well as a recreational park to provide a quality, conducive and sustainable living environment. The private developers have delivered residential units and bungalows, semi-detached houses, shopping complexes, an AgroTech Industrial Park, Golf Residential Park, Homestead Water Park, Medical and Health Resort, Motor Sport Centre and Research and Development Centre. Additionally, Bandar Seri Iskandar opens up new opportunities for the Kinta-Pangkor Knowledge Corridor, creating jobs and business opportunities in the regional Perak. The District Council and private developers are actively

organising branding and marketing activities to attract multinational companies to invest and set up plants for long-term economic growth in the area and hence, further enhancing its knowledge city competitiveness and providing an environment for building the city to be a successful knowledge city. It is expected that the entire city to be fully developed in a decade and its population to reach up to 450,000 people.

4.2. Universities, knowledge industries and knowledge workers of Bandar Seri Iskandar

As part of the National Higher Education Agenda and in order to develop a strong and technically skilled workforce in the State of Perak, the first university of Bandar Seri Iskandar, *Universiti Teknologi Petronas (UTP)*, was established as a private university in 1997 by the largest petroleum company of the country, Petronas, aiming at realising Malaysia's aspiration to produce qualified human resources especially in the field of science, engineering and technology. The UTP campus is built in stages on a 400 hectare site, with a total population of about 5,000 students and over 500 academic and administrative staff. The university offers a wide range of science, engineering and technology programmes at undergraduate and postgraduates levels complemented with a strong focus on R&D. UTP offers programmes that are designed with knowledge industry relevance to provide a dynamic urban and learning environment. All undergraduate and postgraduate programmes of the university have received accreditation from the National Accreditation Boards and also some programmes gained international recognition, and received prestigious awards.

UTP has established its Research and Innovation Office to drive, facilitate, commercialise and promote university's R&D. The office fulfils the requirements made by university researchers, external clients, and meets the future needs of the university R&D including the intellectual property requisition management and commercial exploitation of technology. UTP has set a vision to become a leader in R&D and consultancy, recognised internationally as a partner of choice for industries, a respected member of scientific communities and an innovation platform for the research fraternity. Furthermore, UTP functions not only as a teaching university producing graduates and knowledge workers, but also manages to create social and economic value to its vicinity and enhance industrial competitiveness through technology and innovation. UTP has brought economic, qualitative, intrinsic, environmental and non-pecuniary benefits to the city and its residents, and contributed to the knowledge city formation via: fostering young knowledge workers; creating commercialised knowledge; generating income and employment in the region; adding scientific and economic value with research to the areas of education, technology, recreation, cultural and community services; increasing attractiveness of the city that supports the recruitment of exogenous talent, industry and businesses, and; improving socio-economic and educational status of residents, which translates into an increased quality of life.

The second university, *Universiti Teknologi MARA (UiTM)* of Bandar Seri Iskandar was established in 1998 with the cooperation of Perak State Government as a public university. The university occupies an area of 165 hectares and has a population of more than 10,000 students and 1,000 academic and administrative staff. The university has an active R&D centre and its vision is to become a premier university of outstanding scholarship and academic excellence capable of providing leadership to Malaysian's dynamic involvement in all professional fields of world class standards in order to produce globally competitive graduates with sound ethical standing. UiTM is aimed at enhancing the knowledge and expertise of Malaysian's in all fields of study through professional programmes, research work and community service based on moral values and professional ethics. UiTM is also equipped with the state-of-the-art facilities for both research and teaching. Being a main branch campus, there are four faculties in operation – i.e. architecture, arts and design, accounting, and information technology. UiTM is also active in conducting research in line with its aspiration to become a 'research university' under its Research Management Institute. This special division is established to manage, monitor and implement science and technology research, social science and management research, consultancy, innovation and publication. The courses offered in UiTM are also recognised by the professional accreditation bodies both at national and international levels. UiTM is working closely both with the local knowledge industries and other private organisations in

conducting research and consultancy services, which provides synergies for building Bandar Seri Iskandar Knowledge City.

All other higher education and R&D institutes of Bandar Seri Iskandar are publicly owned and aimed at providing training and skills particularly to the youth. *The MARA Professional College*, for example, offers programmes ranges from quantitative science to business management. Meanwhile, *The National Youth Skill Training Institute* provides skill oriented courses such as computer networking, multimedia, audio-visual, and electrical and electronics. Both of these higher education establishments support the development of Bandar Seri Iskandar as a knowledge city by providing a platform for knowledge transfer, at the same time, supporting the local labour market with young skilled knowledge workforce, and increasing the education and knowledge levels of the residents (KPerak, 2010).

The city management has also rigorously inviting private sector to invest and provide knowledge-based industrial services and activities to further complement the development of Bandar Seri Iskandar Knowledge City. For instance, presently, there is a rapid increase in the pharmaceutical companies' R&D activities in the *Pharmaceutical Technology Park* that provides synergies for knowledge generation, exchange and knowledge industry clustering. Apart from providing employment and strengthening the local economy, such knowledge-based activities are also the best enablers to promote innovation facilities through partnership with the local universities. Another knowledge-based industrial development, which is in the pipeline, is the new *domestic airport* development adjacent to the city. This new airport will further increase the level of accessibility to the city and will form a critical knowledge infrastructure (Perak Tengah District Council, 2011).

Current population of the city is only a quarter of what is planned for 2020. This is to say city is expected to face a rapid growth over the next decade. Existing land use allocation in Bandar Seri Iskandar is dominated by the knowledge sector – i.e. universities, industry and institutions (Figure 5). In the local development plan almost half of the land in the city has been allocated for hosting the knowledge sector. Meanwhile, residential, commercial, transport, green space and other areas take up the other half and a large land is reserved for the future growth. Figure 6 reveals the pattern of land use changes during the last 20 years of city's development. Since 1990 there has been a tremendous growth from 6% to 43% of land use for universities and R&D institutions. In the existing land use allocation a large proportion of the land is developed considering universities, institutions and the knowledge sector's needs, where this shows us that Bandar Seri Iskandar's spatial planning is fully supporting its emergence as a knowledge city.

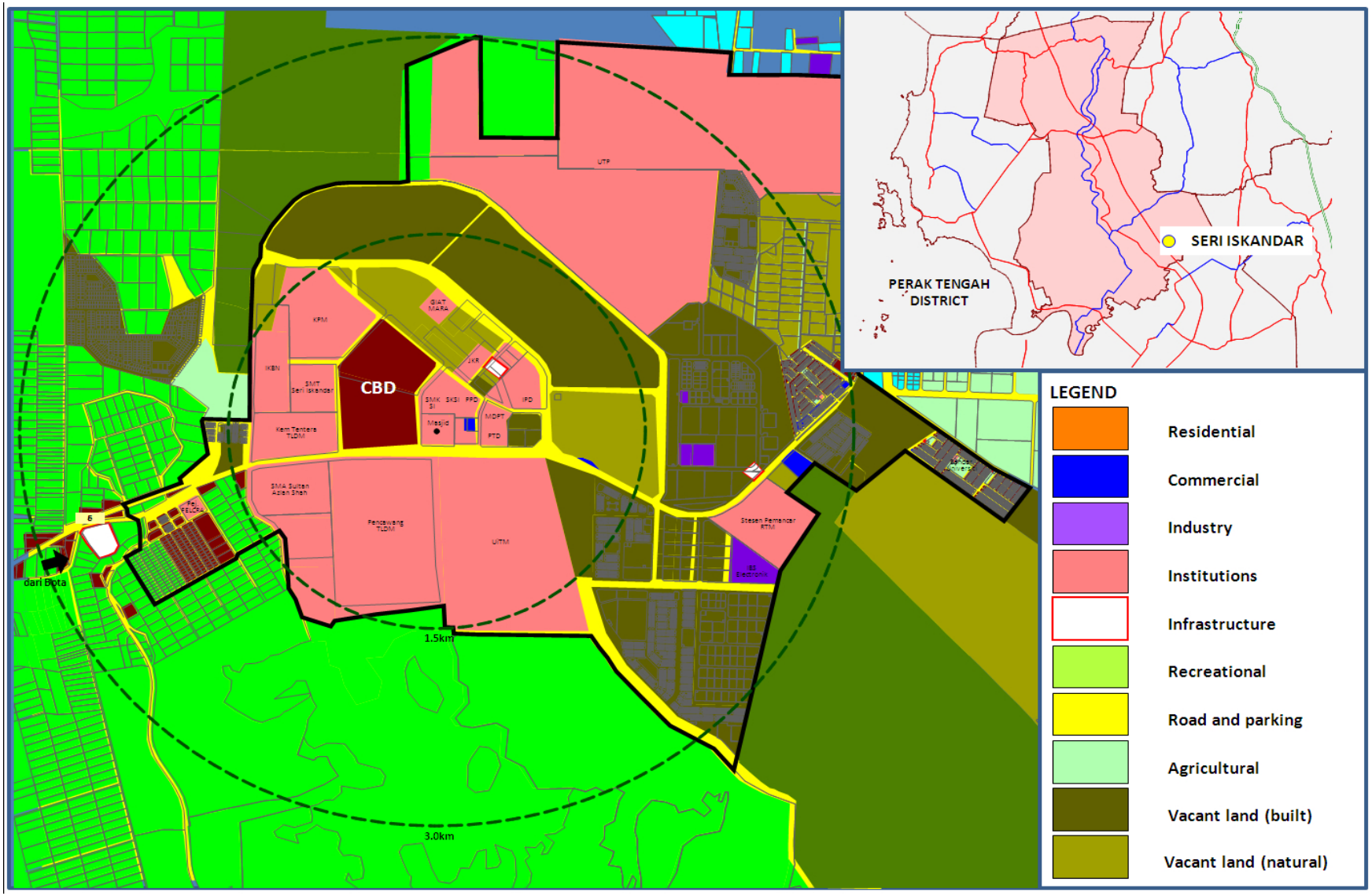

Figure 5: Land use of Bandar Seri Iskandar Central Business District (Perak Tengah District Council, 2002)

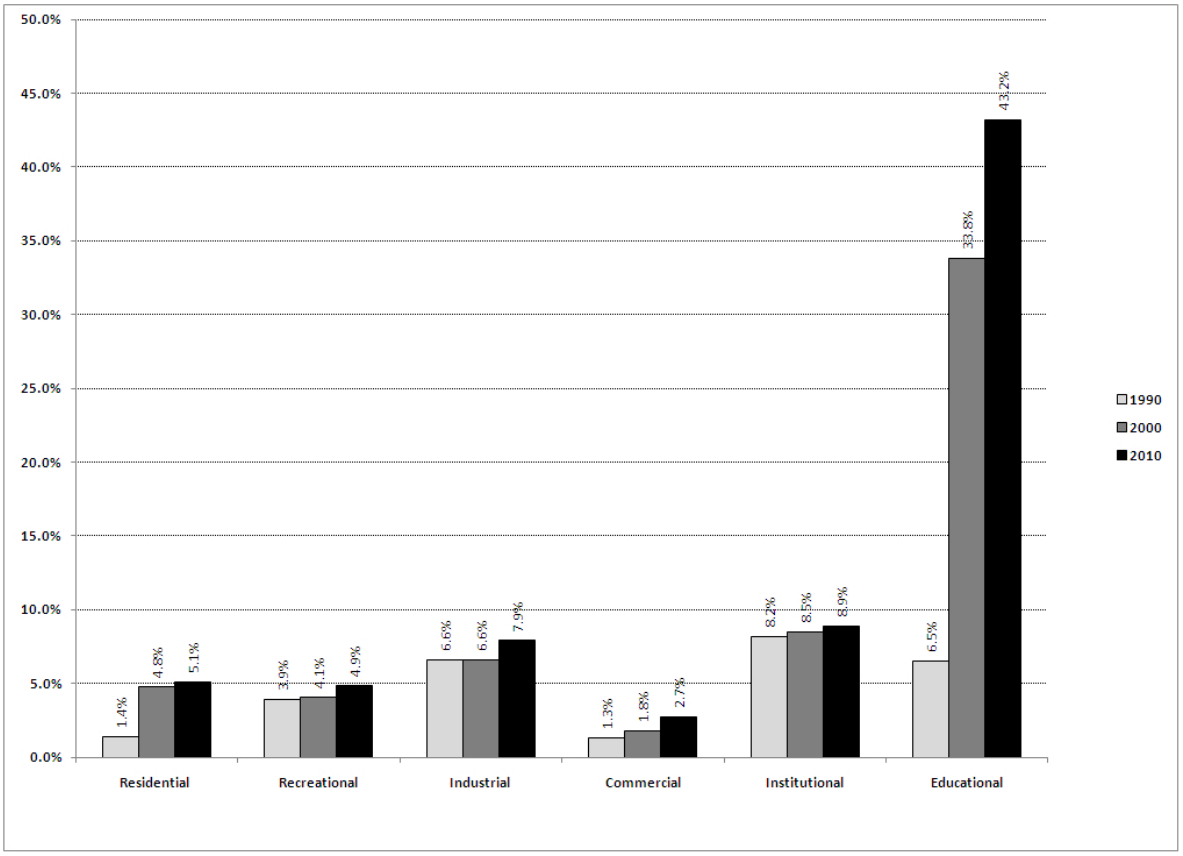

Figure 6: Land use changes in Bandar Seri Iskandar between 1990 and 2010 (Perak Tengah District Council, 2002)

4.3. Local expert interview findings

In order to further capture the dynamics, including the role of universities, in the development of Bandar Seri Iskandar as a knowledge city a series of interviews were conducted with executive and senior managers of the Perak State Government, Perak Tengah District Council, Universiti Teknologi Petronas (UTP) and Universiti Teknologi MARA (UiTM). From each of these institutions two people were interviewed. In these interviews a semi-structured telephone interview technique was used. Interviews included the following four key questions and participants were also asked to provide their opinions on any other issues relevant to building a prosperous knowledge city in Bandar Seri Iskandar:

1) What are the main challenges and opportunities in developing Bandar Seri Iskandar as a knowledge city?
2) What roles academic, public and private sectors have been playing in Bandar Seri Iskandar's development as a knowledge city?
3) How well Bandar Seri Iskandar has been performing in attracting and retaining endogenous and exogenous talent and investment?
4) What other actions can be taken to support Bandar Seri Iskandar's vision to become a prosperous knowledge city?

Responses of the interviewees provided us with useful insights in the current and future issues related to the knowledge-based development of the city. Local experts that are participated to the interviews saw global crises (i.e. financial or natural disasters) and relatively limited private sector investments among the primary challenges in developing Bandar Seri Iskandar as a fully fledged knowledge city. The secondary challenges were mentioned as Bandar Seri Iskandar being a young city at the teething stage of its knowledge-based urban development, regional and international connectivity problems

(particularly air connectivity), tyranny of distance to global markets, limited marketing and branding efforts, and city being physically constantly under construction. Major opportunities of Bandar Seri Iskandar to develop as a prosperous knowledge city were seen as its reputable education and research institutes, young and talented student and researcher population, public sector presence, commitment and investment in the strategic policy area and meeting the infrastructure needs of the city. According to the interviewees:

> *"...The global financial crisis that has begun in late 2007 had cut nearly all of the public support behind the development and worsened the private sector interest in the real-estate projects. As a result the knowledge city program was almost put into a hold and turned into a highly volatile project... [However,] slowly changing economic recovery and conditions now provides a promise for the future of the city's knowledge city endeavour..."*

> *"...[The biggest strength of the city is having] an enormous support from all of the three-tier governments particularly in meeting the infrastructure needs... With such support Bandar Seri Iskandar is building not only essential infrastructure services such as water supply, sanitation, transportation, energy and high-speed broadband internet, but also knowledge infrastructure services through universities that are supporting human resources development, institutional strengthening and capacity building in the city..."*

Interviewees had a consensus on the policy of using education and research institutes as the main anchors for the development of Bandar Seri Iskandar. They have also underlined the role universities played in increasing the reputation of the city and especially supplying city with the most needed skilled labour force. Some experts also highlighted the contribution of universities and their students to the social scene and life of the city. One interviewee strongly criticised government not directly involving either of universities' executive management team members in the decision-making process of the city's future development. All interviewees pointed out the significant role public sector, more specifically Federal, State and Local District Governments, have been playing in the planning and funding of the knowledge-based development of Bandar Seri Iskandar. Private sector's cautious approach in the early years of the project and during the global financial crisis was put forward as the most sensitive and tense periods of the city's knowledge-based development journey. However, like in many other knowledge city projects private sector's involvement is the decider of the success of the project. After market forces testing the waters in Bandar Seri Iskandar private sector started to invest in the city and expected to be the main decider of the success of the knowledge city endeavour of the city. Hence, the need for a closer academic, public and private sectors partnership (i.e. triple helix model) in the formation of knowledge-based urban development strategy and practices have been seen as a potential solution to overcome the risk each of these sectors take on. Additionally, it is suggested that both universities need to play more proactive roles in the formation of the vision of the city and involvement in the strategic decision-making processes. As stated by one of the participants:

> *"...Perak State and Perak Tengah District Council are the true champions of the Bandar Seri Iskandar [Knowledge City] project as they initiated the whole knowledge-based development dream. However, without UTP and UiTM the dream would have never ever been that close to realisation... Moreover, for sure private sector's increasing interest in this ambitious knowledge city project will make a difference and will speed up the development process... What is so far lacking in the entire knowledge-based urban development sphere in Bandar Seri Iskandar is a coordinated partnership between all the three sectors... It is about time that the leadership flag of the project to be passed on from the government and shared by the academic-public-private sectors..."*

Local experts pointed out to the crucial importance of strategising knowledge-based development policies to attract and also retain knowledge-workers, -industries and -businesses in Bandar Seri

Iskandar. For attracting talent creating a human climate (i.e. quality of place and life, tolerance, diversity, sense of community, democratic rights, etc.) and for attracting investment a business climate (i.e. profitability, easy access to consumers and markets, skilled workforce, subsidies, tax exemption or benefits, etc.) are reported as the critical requirements for the city. Although, there is a recorded significant progress in the establishment of both human and business climates, still more policy injections are required for further augmenting such climates. Although the city was quite successful in managing to attract knowledge-industry investors to its Pharmaceutical Technology Park, AgroTech Industrial Park, and real-estate developers to its Residential Precincts, still the city has not successfully managed to draw vast numbers of knowledge workers, knowledge industries and businesses – apart from the two major universities and their R&D centres. Two of the interviewees stated that:

> *"...Bandar Seri Iskandar has many competitors [in the country and its region,] hence, in order to attract knowledge workers and knowledge businesses the city management needs to create: a business environment that comprises of the attitude of the government and lending institutions toward businesses and business activities, and advantageous taxation regimen, and; a human environment that provides a high standard of and also alternative living[-working-playing] options and opportunities to all citizens – particularly for the young knowledge workers and university students..."*

> *"...Being a young city developed from scratch could be a big disadvantage for attracting talent and investment. At a first glance this might look like a disadvantage for Bandar Seri Iskandar because the creative class of the knowledge workers generally prefer to work and live places that are unique, has a past, history, customs, and are not lacking character and not so sterile... [On the contrary,] while the city is being developed it is not considered as a replicate of another successful knowledge city. The city is purposely aimed to be built on the region's tangible and intangible assets of multi-cultural heritage, people, architecture, hospitality, and cuisine... The city is also supported with two major universities and numerous government headquarters in order to flourish its development. However, there is still much to be done to attract particularly international talent and investors to the city..."*

Participants agreed on that "a more concerted and coordinated effort from academia, public and private sectors are needed to further foster the growth and development of economical, environmental, institutional and social aspects of Bandar Seri Iskandar to become a fully functioning prosperous knowledge city". Experts also noted that Bandar Seri Iskandar's knowledge-based development needs to be integrated or linked with other larger regional, national and international knowledge-based developments including the Perak Tengah Knowledge Region, the Kinta-Pangkor Knowledge Corridor, the Multimedia Super Corridor Malaysia, Singapore's One-North and other developments from the South-East Asia and elsewhere. Experts recommended that:

> *"...[Bandar Seri Iskandar, in isolation,] would not have much chance to achieve its large knowledge-based development endeavours... The city would definitely benefit from the linkages and integration with other similar regional, national and even international projects..."*

> *"...Bandar Seri Iskandar should brand its knowledge city as a 'University Knowledge City' and target to become one of the largest education hubs in the country and in the South-East Asia... This way it will not only secure to get more funding from the public [and private] sector[s], but also will boost city's creative industries and service sector..."*

Overall, the local experts seemed to be highly satisfied with the progress of the city in moving towards a knowledge city. However, they also emphasised that after 30 years Bandar Seri Iskandar is still at the early stages of its knowledge city journey and the city has to make the best use of its

knowledge assets including universities and skilled people to achieve its vision and goals. The interview findings are summarised in Table 2 below.

Table 2: Issues related to the knowledge-based development of Bandar Seri Iskandar

ISSUES	PRIMARY	SECONDARY
Knowledge-based development challenges	▪ Global financial and natural crises ▪ Private sectors limited interest in projects	▪ Being a young city ▪ Distance to global markets ▪ Connectivity issues ▪ Lack of effective marketing and branding policies ▪ Being constantly under construction
Knowledge-based development opportunities	▪ Reputable education and research institutions ▪ Young and talented population ▪ Public sector's continuous support	▪ Cluster of public sector agencies ▪ Employment options ▪ Knowledge-based urban development strategies
The role of academia	▪ Providing a pull factor by its reputation ▪ An anchor of the knowledge-based development ▪ Be active in taking leadership and actions in knowledge-based urban development in the region	▪ Contribution to the skilled labour force pool ▪ Contribution to the social scene/life ▪ Potentially attracting creative industries (i.e. entertainment business and industries) and service sector
The role of public sector	▪ Infrastructure investments and public amenity and service provision ▪ Initiator, key funder and champion of the knowledge-based urban development	▪ Providing employment opportunities ▪ Increasing the competitiveness edge of the city
The role of private sector	▪ Late joiner but one of the main drivers of the success of the knowledge-based development ▪ Being a highly profit driven sector and representing the market force	▪ Public-private partnerships and triple helix model partnerships would be beneficiary for the further engagement of the private sector in projects
Attracting and retaining talent	▪ Some achievements are noted but more policy injections needed to better strategising knowledge-based development policies to attract talent ▪ Further efforts needed in creating the human climate	▪ Limited high-standard of living ▪ Lack of alternative lifestyle options
Attracting and retaining investment	▪ Some achievements are noted but more policy injections needed to better strategising knowledge-based development policies to attract investment ▪ Further efforts needed in creating the business climate	▪ Policies needed to increase knowledge industry profitability as this is the key factor to attract investment ▪ Subsidies, tax exemptions or benefits would be useful
Other related issues	▪ Need for an integration of the city with the neighbouring knowledge region and knowledge corridor projects ▪ The city could be branded as a 'University Knowledge City'	▪ Need for establishing linkages with the national and international knowledge cities or regions (i.e. MSC, Singapore One-North)

5. Conclusion

The literature review findings have shown us that globalisation with the emergence of knowledge economy and information technologies are continuously shaping urban and socio-economic development of our cities. In this new era, universities are not only acting as calling cards to draw students, faculty and visitors to a place, but also playing roles as viable employers and economic

engines of these places. Much like in the developed country context, universities in the developing countries are increasingly being recognised as knowledge hubs, exercising a strong influence in the intellectual vitality of the city where they are embedded. Furthermore, universities, in joint action with governments, businesses and society at large, are necessary prerequisites of constructing and maintaining knowledge societies, and therefore, supporting the emergence of prosperous knowledge cities. As Franz (2008) puts forward, amongst the cities that have decided to pursue a 'knowledge city development strategy', those housing universities and research institutes dispose of an advantageous endowment for this strategy.

The case investigation at Bandar Seri Iskandar has revealed that universities need to use their potential to the full and be proactive in taking leadership and actions in the knowledge-based development of their regions. Universities are often among the largest employers in the community. For a community to flourish, a university could serve as an anchor and stabilising force providing intellectual, cultural and recreational amenities. Although in Bandar Seri Iskandar a quantum of knowledge producing institutions and their knowledge workers have been identified, the city may still be at its teething stage in moving towards a full-fledged and matured knowledge city.

Interview results have shown that even though more effective policy injections are still required, so far city officials have managed to identify and put relevant knowledge-based development strategies in place. What is urgently needed is to design a more conducive environment, which is an issue needs to be addressed to attract and retain more knowledge workers. Being part of the knowledge community in Bandar Seri Iskandar, knowledge workers are the main assets for building and enhancing the knowledge city. In addition to that, both tangible and intangible assets and elements have to be considered to invest on, and; a more concerted and coordinated effort from the academia and public and private sectors for further fostering the growth and development of the city as a fully functioning knowledge city is required.

Universities in small to medium scale cities, like in the case of Bandar Seri Iskandar, often will have large-scale leakages due to the pulling factor from their immediate metropolitan areas. In the long run, this would reduce the formation of human capital and the area's attraction for skilled labour and employment. Therefore, rather than being a standalone small scale knowledge city, the city might consider being a hub point of a larger 'knowledge region or corridor'. For instance, as mentioned in the *KPerak* initiative, the city should be integrated with the planned Perak Tengah Knowledge Region and also with the Kinta-Pangkor Knowledge Corridor and the Multimedia Super Corridor. Linkages with other international knowledge cities, regions and corridors will be also invaluable for Bandar Seri Iskandar. This new potential role, as a knowledge hub, may uplift the development of the city. This may also assist the city to better incorporate itself into a larger geographical area that could also help attracting and retaining more talent and investment to Bandar Seri Iskandar.

The current knowledge-based urban development practice in Malaysia confirms the trend of government support and continuous nurturing for the future development of Malaysian cities and universities as critical knowledge hubs. The future development directions were envisioned by the Prime Minister of Malaysia, Najib Tun Razak, as "...investing on infrastructure (including universities) to cater for greater knowledge acquisition; ...embarking on initiatives that would attract value added investments into the city through technology transfer; ...incorporating learning and knowledge culture among the city dwellers, and; ...fostering a knowledgeable population in the knowledge economy to bring Malaysia to a greater height in development and progress...". We believe that the learnings from the Malaysian experience might provide useful lessons for other cities aiming to utilise universities as key leverages for supporting their knowledge city (trans)formations.

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